APRIL 1991 VOLUME 6, NUMBER 4 $10 YEAR

SEATTLE AREA TIMEX/SINCLAIR USER GROUP NEWSLETTER

SWUM

SEATUG MEETING

April 4, 1991
Thursday 7:30pm
University Federal Savings Bank
8517 35th Ave. NE, Seattle

Attention:
Sinclair usergroups...

Please direct newsletter exchanges to:

Robert Cazares
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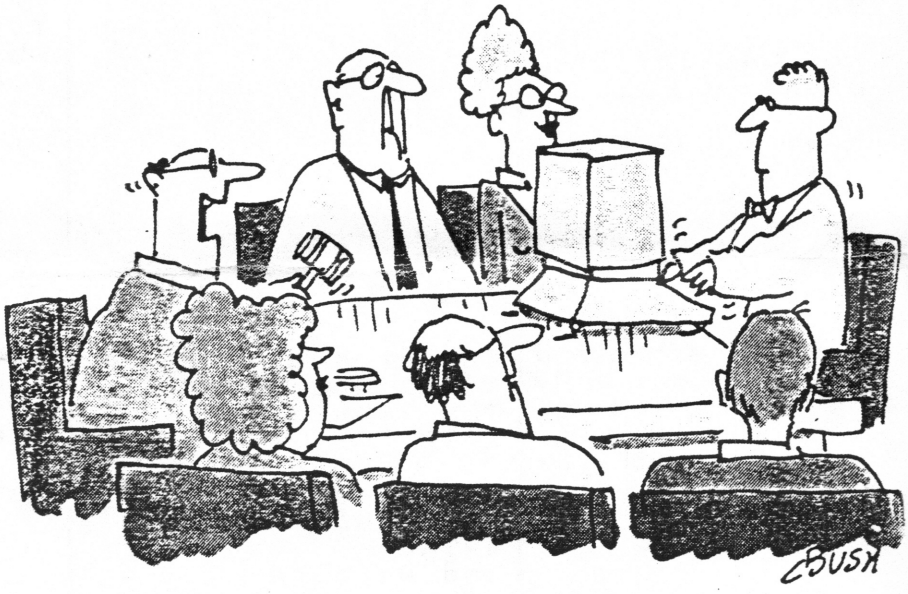
Seattle, WA. 98102-4646

IN THIS ISSUE

Minutes
swum reprint
QL Primer
SIERPINSKI'S GASKET
Random Bits
Games
Classifieds



"Will the secretary please read the nanoseconds from our last meeting?"

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SWUM CONTENTS

MINUTES 4

Clockwatcher Malcolm Post tells all of the March meeting.

APR 10 years ago this month 5

Disassembled BASIC

A review by David Lubar

QL primer 6

Mortgage program and BASIC listing Thanks again Ken!

7

Inject new life into your T/S 1000 and 2068.

Check out SIERPINSKI'S GASKET and we hope you get the point!

Random Bits 8

News from Larry Zunk, Bill Ferrebee, RISC(as if you didn't already know) and pioneers of our time.

9

Games you can play now that the war is over.

A military victory?

You decide while playing your favorite game of choice!

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Letters to the editor

Delemmas
Poke Problems
Abort,retry,fail
Tape load help

Could this be you?

Classifieds

Buy, sell, trade.

Remember: members can advertise free! So give us what ya'got to sell.

Next Month

Guess that number and you may just be driving off in a brand new Ferrari 308 GTS

And more of the usual stuff...

EDITORIAL

Ahhhh, computers...wonderful tools and toys, depending on how you want to view them. Having recently attended the University of Washington Computer Fair, faster, bigger, better, new and improved seems to be the call of the new age. Nothing unusual about that, except IBM and MS DOS. My computer fair buddy pointed out something interesting. He said, "Did you notice all the computers running graphical interfaces with the exception of MS-DOS machines?" Scratching my head and placing my hand to my chin I responded, "Yeah, your right, uhhh, MACS, NeXT, and Amiga computers all sport beautiful GUI's within the window frame of their displays." While the IBM class machines sort of had the idea, they were just not quite as alluring. The appeal for a computer of this sort attracted me long ago but was out of reach, until now. Last month I splurged on an Amiga 2000 with the latest ROM chips and operating system. No hard drive, nothing fancy, just the bare box and one floppy drive. Where do you think I put it? Right on top of the modified PC style box that houses my Zebra disk drive system for the 2068 which produces the graphics you find in this newsletter. It's hard to put the Sinclair away. It's been a good friend for what feels like forever but soon there will come a time when I'll have to find another place for it. Our support is dwindling as is interest in 8 bit computers but the Amiga has a distant cousin, two in fact. The Z88 which I am told has ties to Amiga BASIC and the QL which has the 68008 chip as the heart of it's operating system. Close enough for me. No, I won't abandon my Sinclair computers. I think I'll still continue to grow with them.
And no, there were no Sinclair computers at the fair. Heh, maybe next year!
Till next month---Robert---

ATTENTION BASIC PROGRAMMERS

Z E B U

Zunks Extra Basic Utilites

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MINUTES WITH SEATUG

by Malcolm Post, Secretary

"Nancy and I have decided to join the Information Society and we'd like to have your blessings."

MINUTES OF THE TIMEX USERS GROUP
March 7, 1991

The meeting was called to order 7:47 P.M. by Treasurer ve Battershill in the absence of esident Derryck Turner. ere were seven members and one guest esent.

Dale Fritz reported that he had ceived a call from Derryck questing that he pass on the llowing items of business:

1. A call was received from M. oper that he would like to rchase a Timex 1000.
2. John Dusenberry has a 48K ectrum and Two QL computers for sale.

Anyone interested in selling a S 1000 or purchasing any of hn's computers should contact these ople. It was also ggested that they put their adds in e newsletter.

The Treasurer's report showed at as of February 28, 1991 ere was a balance of $163.00. This ther large drop resulted om larger than usual newsletter sts. The club can not afford continue expenditures at this rate.

Dave also told us that the Sears nitor/tv sets that he ld us about last month were all ld. He doesn't know if any re will become available.

The search for a lower cost means of producing the newsletter has not produced results as yet. The hoped for use of a private copying machine fell through. Robert, who was expected to show up with the newsletters did not arrive.

Our guest, Robert Jorgenson came to the meeting in an effort to locate information on his unusual project. He has a Sinclair ZX-80 which he wishes to modify using modern low-power CMOS components. This would enable him to run it on battery power and reduce the heat within the case. He has identified some components for which there are direct replacements, but needs help on others. Those at the meeting made some suggestions, but others interested in project should contact him.

It was brought to the attention of the group that there is a person by the name of Dan Elliott who is advertising repair of most all Sinclair/Timex products and other associated peripherals at a very reasonable rate. A number of the rates were quoted, such as $5.00 plus parts and shipping for a T/S 1000. If you have need of this service, here is a source.

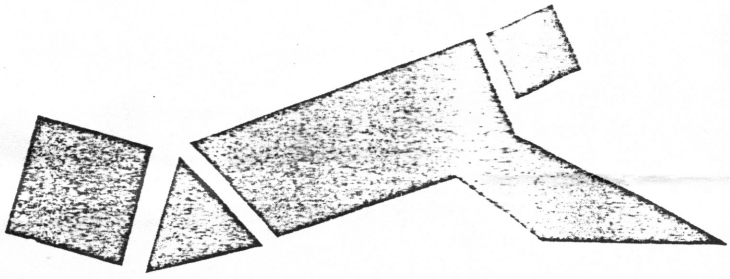
The meeting was adjourned at 9:04.

Respectfully submitted,

Malcolm Post, Secretary

Disassembled BASIC —A Review

David Lubar



Disassembled Basic, Linsac, 68 Barker Road, Middlebrough TS5 5ES, England. 48 pages, paperback.

Linsac has published a disassembled listing of the Sinclair Basic. What, you may ask, is a disassembly? Well, when machine language is placed in memory, either in RAM or ROM, it is stored as numbers. These numbers represent machine-language instructions, called "mneumonics" since they are abbreviated versions of the command. For example, an increment instruction is represent as INC. When a programmer enters a program using these or op codes, an assembler is used to turn the commands into numbers. A disassembler reverses the process, turning the numbers into lines of code so humans can understand it.

A few lines of disassembled code look like this:

```
07BE 2B      L07BE   DEC     HL              ;**INTERPRETER**
07BF 222640          LD      (L4026),HL      ;SAVE PROG ADDRESS
07C2 210000          LD      HL,L0000        ;ZERO  HL
07C5 00              NOP                     ;  AND 'NEW' CODE
07C6 221540          LD      (L4015),HL      ;ZERO POINTER
07C9 211940          LD      HL,L4019        ;POINT TO SYNTAX FLAGS
07CC CB6E            BIT     5,(HL)          ;TEST IMMEDIATE FLAG
07CE 2807            JR      Z,L07D7         ;JUMP IF IMMEDIATE
```

The first column contains the memory locations of the code. In this example, the code starts at hex address 7BE. The next column shows the hex value or values for the command. Commands require from one to three bytes, depending on how much information is required. For instance, decrementing a register requires only one byte. Loading a single register with a number would require two bytes, one for the command and one for the number to be loaded. Loading a register with a value from a memory location requires three bytes, one for the load command and two for the value of the location. The third column is for labels. In this case, the labels used are just the locations of the commands prefaced by an L (labels must start with a letter, though they can contain numbers). There are two uses of labels. First, when assembling the code, you can refer to the label instead of the location. Thus, if you have a segment of code that multiplies two numbers, you could label it MULT. When you wanted to jump to that code, you could say JP (for jump) MULT. When the program is assembled, the correct value for MULT will be inserted.

The other use for labels is to make the code easier to read. When you are scanning a disassembly and see MULT, you know you have found the multiplication routine. Unfortunately, the Linsac disassembly doesn't use this kind of label, making the listing harder to decipher. The label L07BE tells us that the line is at 7BE, but doesn't give us any useful information.

The fourth column contains the mneumonics, followed by any values used by the commands. The final column contains comments, making up in part for the lack of meaningful labels. The comments help, but they are vague in places.

Stepping through the code, the first command decrements a pair of Z-80 registers called H and L. Next, the value in these registers is stored in memory. The HL registers are loaded again, this time with values from another area of memory. The NOP command stands for "no operation." Possibly, this byte was left open for future changes in the code, or was created by an earlier change in the code. The comment isn't clear. The next two commands again place the register values in memory and reload the registers. The BIT command tests a value stored in location 5 to see whether the command is from a program or from the immediate mode. If the command is immediate, the zero flag is set. The next line jumps to 7D7 if the zero condition is met. Otherwise, the program falls through to the next line (not listed here).

With a disassembled copy of Sinclair Basic in hand, an experienced programmer can work wonders. He can access any of the Basic functions through calls to the monitor, using the USR function. Even more powerful is the potential to use the Basic subroutines from machine language programs. There is no need to write your own PRINT subroutine when you can go through one that already exists in the monitor. In essence, the disassembly puts the full power of Basic at the programmer's disposal, even when he is writing programs in machine language.

The listing comes fully commented, with asterisks marking the function of each subroutine, such as *LIST*, and *PRINT CHARACTER*. As mentioned earlier, there are places where the comments could be clearer. The printout is a Xeroxed copy of a dot-matrix listing, but it is legible. The listing, including a table of referenced lines, is 48 pages long.

Besides being a good tool for programmers, this book could also be used by someone who is learning Z-80 code. By seeing how the commands are used, and what the results are, you can gain an understanding of this machine language.

Well, sorry guys but time wasn't on my side this month. So I'll have to resort to one of my "back-up" articles to fill in for this month.

This is a program orginally wrote for a TRS 80 (I think) that I rewrote for the QL. It is just a very basic loan comparing program. It does however allow you to compare different interest rates, periods of repayment, or amount of the loan.

Just type it in, and run it. When it's printing results to the screen it will pause between each comparison, just hit a key and it will continue. (F5 usually is best)

It's not fancy but it has saved me alot of money in the past.

Till next month, take care and happy computing!

```
400 OPEN #1,CON_480X200A20X6:CLS #1
410 INPUT "ENTER THE ITEM TO
    VARY-AMOUNT-A, INT RATE-I, OR
    YEARS-Y ";A$
420 S1=1:S2=1:S3=1
430 IF A$=="A" THEN
440 INPUT "ENTER BEGINING AMOUNT,
    ENDING AMOUNT TO CONSIDER ";A0,A1
450 INPUT "ENTER THE INTERVAL BETWEEN
    PRINTS (I.E. 1000) ";S1
460 GO TO 580
465 END IF
470 IF A$=="I" THEN
480 INPUT "ENTER THE LOWEST AND
    HIGHEST RATES TO CONSIDER ";R0,R1
490 INPUT "ENTER INTERVAL BETWEEN
    PRINTS (I.E. .25 FOR 1/4 ";S2
500 GO TO 550
505 END IF
510 IF A$=="Y" THEN
520 INPUT "ENTER THE LOWEST AND
    HIGHEST NUMBER OF YEARS TO
    CONSIDER ";Y0,Y1
530 INPUT "ENTER THE INTERVAL BETWEEN
    PRINTS (I.E. 5) ";S3
540 REMark *******ENTRY OF CONSTANT
    ITEMS******
550 INPUT "ENTER MORTGAGE AMOUNT $";P
560 A0=P
565 A1=A0
570 IF A$=="I" THEN GO TO 630

580 INPUT "ENTER THE INTEREST RATE
    ";I1;"%"
590 IF I1>=1 THEN GO TO 610
600 I1=I1*100
610 R0=I1
615 R1=R0
620 IF A$=="Y" THEN GO TO 650
630 INPUT "ENTER YEARS OF THE MORTGAGE
    ";Y
640 Y0=Y
645 Y1=Y
650 PRINT:PRINT:PRINT
660 FOR Y=Y0 TO Y1 STEP S3
670 PRINT "FOR A MORTGAGE OF ";Y;"
    YEARS"
690 FOR I1=R0 TO R1 STEP S2
700 PRINT "USING THE INTEREST RATE
    ";I1;"%"
710 PRINT
720 PRINT "MORTGAGE";TO (15);"MONTHLY
    PI";TO (30);" TOTAL"
730 PRINT " AMOUNT";TO (15);"
    PAYMENT";TO (30);"INTEREST"
740 PRINT "--------";TO
    (15);"----------";TO
    (30);"----------"
750 FOR P=A0 TO A1 STEP S1
760 I=(I1/100)/12
770 M=I/((1+I)^(Y*12)-1)+I
780 M1=M*P
790 I3=M1*Y*12-P
800 PRINT P;TO (15);M1;TO (30);I3
810 NEXT P
820 PRINT"**************************"
825 PAUSE 500
830 PRINT \
840 NEXT I1
845 PRINT
850 NEXT Y
860 PRINT
870 PRINT
880 STOP
```

SIERPINSKI'S GASKET
by Dale Fritz SEATUG

There is much more to fractals than the Mandelbrot Set. Apparently, in September 1989, NOVA put on a show about the science of chaos, which noted that chaos is not a set of random events, as many of us think, but is quite ordered. Their example was Sierpinski's Gasket:

1. Plot 3 points of a triangle and label the points as 1, 2, 3. Select a starting point in or out of the triangle and roll a three-side d die. (Physically, you could use a six-sided die with 1,2 as 1 ,3,4 as 2 and 5,6 as 3.)

2. Draw a line between your point and the side of the triangle indicated by the die. The mid-point of this line is your next point.

3. Roll again and go to Step 2.

The concept is simple and common sense says that a plot of the points would be all over the paper. Al Albrecht of Vancouver BC was intrigued and whipped up a short program in the Vancouver Sinclair Users Group ZX-APPEAL of OCT 89 with rather startling results. About a year later, Tim Swensen of Toronto Timex-Sinclair Users Club published a shorter program in SINC-LINC, Sep-Oct 90.

Tim's program for the 2068 starts with only the corner triangle points and plots about 500 points a minute. The program and plot results are shown on this page. Surprisingly, one can get excellent results with the 1000. In SLOW, the 1000 plots about 120 points a minute and with the option to go FAST, the plot shapes up quite rapidly. The 1000 program and plot are shown.

Looking at Sierpinski's Gasket outlining a large triangle with smaller triangles with smaller triangles with smaller triangles as small as the scope will discriminate is amazing to me. What would happen if we used a 4-sided or 6-side d figure? (Does common sense help?) Try it.

```
 10 REM   THE CHAOS GAME by Tim
          Swensen,
          SINC-LINK SEP-OCT 90,
          TT-SUC  Toronto
 20 GO TO 150
 30 REM ...LOOP...
 40 LET n=n+1: LET x1=x: LET y1=y
 50 LET roll=INT (RND*3+1)
 60 IF roll=1 THEN LET x2=10: LET
    y2=12
 70 IF roll=2 THEN LET x2=246: LET
    y2=12
 80 IF roll=3 THEN LET x2=128: LET
    y2=160
 90 LET x=(x1+x2)/2: LET y=(y1+y2)/2
100 PLOT x,y
110 IF n/250=INT (n/250) THEN BEEP
    .1,.1: PRINT AT 21,14;n
120 GO TO 40
140 REM ...INITIALIZE...
150 BORDER 0: PAPER 0: INK 7
160 LET n=0: CLS
170 PRINT TAB 7;"SIERPINSKI'S GASKET"
180 PLOT 10,12: PLOT 246,12: PLOT
    128,160
190 LET x=RND*99: LET y=RND*99
200 PRINT AT 21,7;"(After rolls"
210 GO TO 40
9980 CLEAR : SAVE "chaos"
```

"It's a personalized number. I'm in for computer fraud."

Random Bits

by Chuck Kereluck

THE WORLD OF LARRY ZUNK

Mr. Larry Zunk, of Zunk Custom Electronics (1419 Ferris Ave., Waxahachie, TX 75165) and one of the shining stars of 2068 developments, has just completed work on another software and hardware dynamic duo. CADZ-PC V1.0 and a 2068 mouse. That's right. And it looks like a real zinger! In case you're wondering about the version number, CADZ-PC is a complete rewrite of the previous CADZ. It's so different and so much better, that, instead of just adding a new rung to the version ladder, it qualifies as a whole new program! It is so new, that I doubt if many other clubs have even seen it. And to top it off, he has developed a Stick Mouse ("souse") to be used with it!

What is CADZ-PC, and its predecessor, CADZ, used for? For the hardware folks, it's used for designing those printed circuit board patterns for home-brew electronic projects. From the sample PC board received, we can attest that it does an excellent job. Real professional looking. For the graphic artist and desktop publisher, it allows a mix of text with graphic designs that's second to none. UDGs. Edit the UDGs. Four text sizes. Text editor, even!

There's so much to this, that a mere cursory review cannot do it justice. That's why we're going to demo it at the April meeting. For those who can't make it, write Larry at the above address for more info. This is mainly for 2068 Larken disk systems (the most popular) with 256K RAM. For converting to others, use Larry's tape version with supplied instructions. Tell him SWYM sent ya. And what about that Stick Mouse?? It's an ingenious little device that looks like a mouse but works like a joystick (Remember another device that looked like a trackball but worked like a joystick?). This is a personal developmental project of Larry's that not for sale (yet). Built in a small, lo-profile plastic case, the "SOUSE" rests on a tall, centrally-located, rubber foot. It is this point that gives the souse its pivot action. On this same side, at each corner, is mounted a lever-actuated micro-switch, on which a tiny wheel is mounted at the end of a lever. The switches correspond to up/down/right/left. The user works the pivot, actuating the needed switch and pressing a top mounted momentary contact push button on top (fire), whenever needed. This is an interesting arrangement, although I found certain expectations unsettled as I worked a drawing in Tech Draw Jr. It takes some getting used to. Once this is overcome, movement is fluid. We'll save the schematic and pictorial for a later issue.

BILL FERREBEE NEWS

Got a call from Radio WXIL-FM, the other night. For those not in the radio-know, this is a commercial broadcast station in West Virginia. Bill Ferrebee, DJ on the air! Actually, we were chatting between announcements. He's still writing monthly columns for Vulcan's Computer Monthly and still writing and improving 2068 software. Like yours truly, he has yet to cross that IBM barrier. He has, however, 'gone disk.' He uses both Oliger and Larken. Expect some SEATUG exposure in Vulcan's. Perhaps other surprises, await. Why don't you write him for his latest list in 2068 stuff? His address is 749 Hill Street, #6, Parkersburg, WV. Tell him SWYM sent ya!

ANOTHER ONE BITES THE DUST

Pioneers of today's electronic marvels are a vanishing breed. Remember when the developer of the IC passed away? Now, we learn that the actual inventor of the transistor, John Bardeen, has died at the ripe young age of 82. John earned the 1956

RANDOM BITS cont...

Nobel Prize for Physics for his work in 1947 at Bell Laboratories. Mr. Bardeen didn't stop there, however.

In 1972, he won another Nobel Prize for developing the theory of superconductivity.

How could such a giant go through life, virtually unnoticed among the general popular circles? After all, his name doesn't exactly come rolling off your tongue if asked where the transistor came from. This was a personal choice of John's. He purposely avoided publicity. In fact, he was nick-named "Whispering Bardeen" by his colleagues.

Without this man's efforts, there could not have been any IC development. There would be no transistor radios, walkie-talkies, virtually everything electronic. If it wasn't for transistors, we would still be a world of vacuum tubes. How many can accurately describe vacuum-tube theory? Think of it: Your "doorstop" TS1000, instead of collecting dust in a forgotten dark corner of your basement, would BE your basement!

Dying of a heat attack on Wednesday, January 30, 1991, in a Boston hospital, John Bardeen will at least be missed by all technically inclined. His life's work will always be with us.

REDUCED-INSTRUCTIONS?

According to Puget Sound Computer User and the New York Times, Microsoft, Compaq and Digital (3 giants, if there ever were any) have agreed to develop a new PC standard using Reduced Instruction-set Computing (RISC). Every once in a while, it seems, someone tries to do this. I remember reading some time ago how IBM was secretly ready to announce this new breakthrough.

Think about this concept, for a moment. Why do this? Does this indicate that things may be getting a bit out of hand in complexity? That maybe they should simplify operating systems? Bring back part of the good-old-days??

If they want reduced-instruction sets, how about resurrecting the TS1000 and TS2068??

GAMES TO PLAY NOW THAT THE WAR IS OVER
by Chuck Kereluck

So here you are: A military victory under our belt and troops are coming home already. No more bombing news. No more projected strategies. No more Peter Arnett. You feel that certain emptiness; a void. A definite something lacking in your now-returned-to-normal life. How to get that old feeling back? That blood-racing-thru-your-veins feeling?? How about some military-oriented computer games?

THE AIR WAR: Relive those exciting days of yesterday, just prior to the "sorties." The time when recon teams were sent behind enemy lines. Now, thanks to the magic of computer simulation, you can be one of them! Appropriate the nearest TS2068 computer and LOAD in "SABOTEUR". There you go! Yeah, the scenery is a bit different: approaching the "bunker" via water instead of sand; but the suspense and strategy remains! Plus the thrill of effecting some of that "collateral damage." Once you escape via the "attack helicopter", you can "return to base" and practice basic airplane flying. You'll need this for the long series of sorties ahead. Capture a TS1000 and LOAD in FLIGHT SIMULATOR. Watch those turns! Check the MAP function and pretend you're flying over Iraq. Choose the LANDING function and imagine you're sneaking in on one of those recently-restored runways. Since touchdown is a bit tricky, you might as well pretend you've been hit and try to come down as gently as possible. Now there's excitement!! Now for some real fun.

FIGHTER PILOT on the 2068. Also TOMAHAWK. It's sortie time! Now here's where you can really effect some damage! Fly over those villages! Zero in on those military targets! Hey!

What are those 'civvies' doing there? Too late! Bombs away! If this is too easy (just like the real thing, huh?), try your hand at CONSTRUX (2068). Here, you can be a recon helicopter, avoiding ground tank fire. The tanks don't move, they just shoot all of the time. Kinda like no one is telling them what to do, because their centralized, communications structure has been eliminated.

By far, one of the most tense and exciting air games is PENETRATOR (2068). You can imagine being led into a strange, massive underground bunker, perhaps belonging to "Sodom", himself. You must constantly shoot rockets and drop bombs (pretend they're laser guided), while countless radar dishes scan you to launch "scud" missiles in your direction. But then, that is your job, isn't it??

THE 100-HOUR GROUND WAR Speaking earlier of tanks, shoot it out with MAD DOG TANK BLASTER (TS1000) and start the timer running. Use that high-tech IR stuff in NIGHT GUNNER (TS1000). Try to beat the coalition's best time by forcing an end to prosecution of the war in under 100 hours! While all this goes on, continue your task with GUNNER (TS1000), where you compute elevation of your gun barrel to neutralize enemy artillery.

ARE YOU READY FOR THE NAVY?

Hey! Don't forget the Navy! They won't! And don't forget about those mines in the Persian Gulf! They won't either! Be a submarine captain in SEA MINES (TS1000) and avoid them like the plague! BATTLESHIPS and SALVO are exciting ship-to-ship combat scenarios. Played on the TS1000, they'll make shark food out of what's left of the Iraqi Navy. One more area of Naval battle fun is GUARDIAN (2068). You have to "stretch" a bit on this one, because although you have conventional and nuclear weapons on your heavy cruiser, you must accept the Iraqis having deadly lasers! Or is that just more wartime propaganda? At any rate, you must "secure the area", before they secure your area. ARE WE GOING TO STORM THE BEACH? or OTHER ATTACKING AVENUES If, just for fun, you wish to play devil's advocate and see what it's like on the receiving (namely, Iraq's) end, play AIR DEFENSE (2068). The coalition bombs are methodically dropping around and on Baghdad. You have to try to shoot them down. On the other hand, they can be incoming Scuds into Saudi Arabia or Israel and you have to blast them with Patriot anti-missile missiles!

For a real sense of strategy LOAD in WAR IN THE EAST (TS1000). Requiring at least 32K (does anyone NOT have this?), this will set you apart before or after Iraq has been vaporized. You are Germany (before they came up with that crazy constitution clause). Invading Russia! The object is Moscow. You are NOT Yeltsin. The year is 1941. This is very extensive and just may be a prerequisite to all Persian Gulf war games we've just been through, just so you can see how easy the latter was! As you've seen there is quite a bit available to whet that ol' guts-and-glory appetite. And I haven't even mentioned the Spectrum or the QL! So, if that hollow feeling is hitting you, about now, just give our good ol' Program Librarian, namely Dale Fritz, a call for your next war fix. And, just in case you get weary of all that violence, you can always opt for MR. ME or PLUKKERS (both 2068). At least with the latter, you're only shooting down birds.

"Well, you certainly can retrieve data. What else can you do?"

DATA Statement Simulation

Richard Turner

One of the most noticeable shortcomings of the ZX80 Basic is that there are no DATA statements.

With numbers it is possible to simulate the DATA, READ and RESTORE instructions by a simple program.

This can be done using a REM statement. The numbers are placed in a list within the REM statement, as is done with DATA statements, separating each number by a comma, and ending the list with a comma.

The DATA is then read by PEEKing the number out of the REM statement and placing it in a variable, as demonstrated in *Demo 1*.

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In this case the number is put into variable *C*. This may then be put into any other variable by using a LET statement such as:

LET A(2) = C

E stores the pointer to the next item of DATA and in this case the start of DATA is at memory location 16427.

LET E = 16427

this will act as the RESTORE statement.

The DATA can be placed anywhere in a program, but the memory location of the start of the data must be found.

The following program finds all the REM statements in a program and prints the memory location where the data will start. Type this in at the end of a program and then erase it after it is used. □

```
10  REM  12, 65, -2165, 9, 0, -1,     DATA STATEMENT
11  LET D = 0                         FLAG FOR + OR - NO.
15  LET C = 0                         NO. READ FROM DATA
16  LET E = 16427                     BEGINNING OF DATA
20  GOSUB 100                         EXTRACT FIRST NUMBER
22  IF D = 1 THEN LET C = -C          IS D SET? IF SO CHANGE SIGN
23  LET D = 0                         RESET FLAG
25  LET E = A + E + 1                 POINTER TO NEXT NO. ON DATA
30  PRINT C                           NO. FROM DATA
40  LET C = 0
50  INPUT A$                          PRESS NEWLINE TO EXTRACT NEXT NUMBER
70  GOTO 20
80  STOP

100  FOR A = 0 TO 100
110  LET B = PEEK(E + A) - 28
120  IF B = 188 THEN RETURN           CHECK FOR COMMA
125  IF B = 90 THEN STOP              CHECK FOR END OF LINE
126  IF NOT B = 192 THEN GOTO 130     CHECK FOR MINUS SIGN
128  LET D = 1                        SET FLAG
129  GOTO 140
130  LET C = C * 10 + B
140  NEXT A
```

Do not use variable A, B, C, D, OR E elsewhere in the program.

Variables

A—Dummy in FOR/NEXT loops
B—Number read from REM statement should be PEEKing
C—Number read from DATA statement
D—Sign Flag + (0) - (1)
E—Pointer to next number on DATA list

```
2000  LET A = PEEK(16392) + PEEK(16393) * 256
2010  FOR B= 16424 TO A
2020  IF PEEK(B) = 254 THEN PRINT B + 1
2030  NEXT B
```

The use of this simulation means that one of the faults of the ZX80 Basic may be easily rectified.

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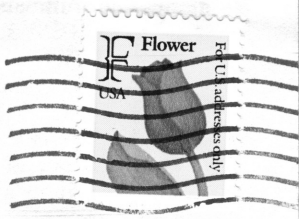

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